SpectraCell Laboratories
Science + Health + Solutions

LABORATORY REPORT

Account Number: 278507

Angela Taylor
5801 Roland Ave.
Baltimore, MD 21210
United States

Name: **Angela L Taylor**
Gender: Female DOB: 03/07/1971

Accession Number:	Q02348
Requisition Number:	1307534
Date of Collection:	06/10/2016
Date Received:	06/11/2016
Date Reported:	06/24/2016

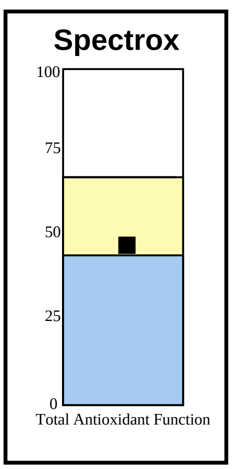
Summary of Deficient Test Results

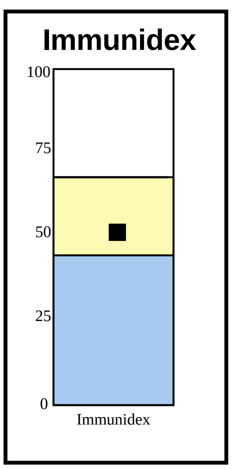
Testing determined the following functional deficiencies:

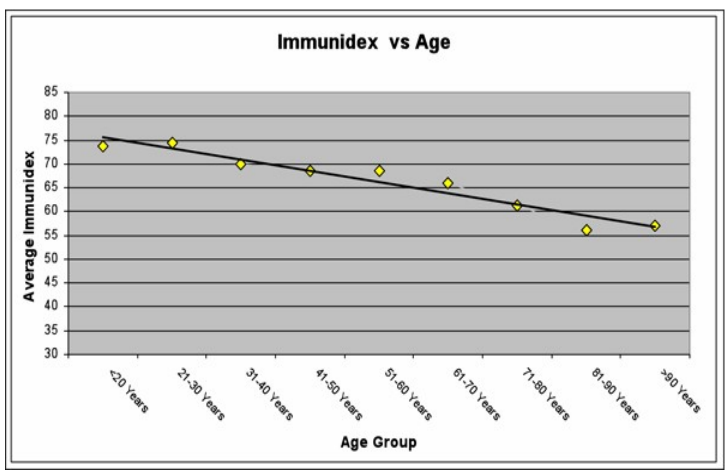
Oleic Acid	Zinc	Glutathione	Copper

Borderline deficiencies include:

Vitamin B3	Glutamine	Inositol	Vitamin D3
Manganese	Vitamin A	Fructose	Coenzyme Q-10
Spectrox	Immunidex		







James W. Jacobson, Ph.D.
Laboratory Director

CLIA# 45D0710715

OVERVIEW OF TEST PROCEDURE

1. A mixture of lymphocytes is isolated from the blood.
2. These cells are grown in a defined culture medium containing optimal levels of all essential. nutrients necessary to sustain their growth in cell culture.
3. The T-lymphocytes are stimulated to grow with a mitogen (phytohemagglutinin) and growth is measured by the incorporation of tritiated (radioactive) thymidine into the DNA of the cells.

The growth response under optimal conditions is defined as 100%, and all other growth rates are compared to this 100% level of growth.

For example – we remove vitamin B6 from the medium and stimulate the cells to grow by mitogen stimulation. Growth is measured by DNA synthesis and the rate of growth is dependent only upon the functional level of vitamin B6 available within the cells to support growth. For Vitamin B6 a growth rate of at least 55% of the growth rate observed in the optimal (100%) media is considered normal. Results less than 55% are considered to indicate a functional deficiency for Vitamin B6. Each nutrient has a different reference range that was established by assaying thousands of apparently healthy individuals.

BREAKING DOWN THE REPORT

1. TEST RESULT (% CONTROL)

This column represents the patient's growth response in the test media measured by DNA synthesis as compared to the optimal growth observed in the 100% media.

2. FUNCTIONAL ABNORMALS

An interpretation is provided for those nutrients found to be deficient.

3. REFERENCE RANGE

This column represents how this patient's result compares to thousands of patients previously tested. A patient's result is considered deficient when it is less than the reference range.

4. GRAPHS

The abnormal range of results is noted in the blue area. Abnormal results are indicated in red. The gray cross hatch area is a representation of the range of test results found in a random selection of subjects.

SPECTROX® – TOTAL ANTIOXIDANT FUNCTION

SPECTROX® is a measurement of overall antioxidant function. The patient's cells are grown in the optimal media, stimulated to grow, and then increasing amounts of a free radical generating system (H_2O_2) are added. The cell's ability to resist oxidative damage is determined. The increasing levels of peroxide will result in diminished growth rates in those patients with poor antioxidant function capacity.

INDIVIDUAL ANTIOXIDANT LEVELS

In the tests for individual antioxidants, it is determined which specific antioxidants may be deficient and thus affecting the SPECTROX® antioxidant function result. For these tests, the patient's cells are preincubated with one of the nutrient antioxidants, i.e. selenium, and then the Spectrox® test is repeated to determine if the addition of selenium improves the patient's antioxidant function. This process is repeated for each individual antioxidant.

Antioxidants tested with this process:
Glutathione, Cysteine, Coenzyme-Q10, Selenium, Vitamin E, Alpha Lipoic Acid, and Vitamin C.

Repletion Suggestions

1. Oleic Acid	2-3 tbsp olive oil daily for repletion of Oleic Acid. Deficiency of Oleic Acid suggests impaired synthesis of unsaturated long chain fatty acids. Take 600 mg b.i.d. (1.2 grams daily) of EPA and DHA in Omega-3 Fatty Acids.
2. Zinc	25 mg daily
3. Glutathione	600 mg b.i.d. (1200 mg daily) of N-Acetylcysteine (NAC) Take each dose with a meal
4. Copper	3 mg daily

Please note: Supplementation is usually required for four to six months to effect the repletion of a functional deficiency in lymphocytes

Suggestions for supplementation with specific micronutrients must be evaluated and approved by the attending physician. This decision should be based upon the clinical condition of the patient and the evaluation of the effects of supplementation on current treatment and medication of the patient.

Micronutrients	Patient Results (% Control)	Functional Abnormals	Reference Range (greater than)
B Complex Vitamins			
Vitamin B1 (Thiamin)	103		>78%
Vitamin B2 (Riboflavin)	70		>53%
Vitamin B3 (Niacinamide)	82	Borderline	>80%
Vitamin B6 (Pyridoxine)	68		>54%
Vitamin B12 (Cobalamin)	22		>14%
Folate	41		>32%
Pantothenate	18		>7%
Biotin	44		>34%
Amino Acids			
Serine	47		>30%
Glutamine	42	Borderline	>37%
Asparagine	57		>39%
Metabolites			
Choline	30		>20%
Inositol	61	Borderline	>58%
Carnitine	61		>46%
Fatty Acids			
Oleic Acid	63	Deficient	>65%
Other Vitamins			
Vitamin D3 (Cholecalciferol)	54	Borderline	>50%
Vitamin A (Retinol)	73	Borderline	>70%
Vitamin K2	47		>30%
Minerals			
Calcium	56		>38%
Manganese	56	Borderline	>50%
Zinc	34	Deficient	>37%
Copper	33	Deficient	>42%
Magnesium	55		>37%
Carbohydrate Metabolism			
Glucose-Insulin Interaction	56		>38%
Fructose Sensitivity	38	Borderline	>34%
Chromium	47		>40%
Antioxidants			
Glutathione	38	Deficient	>42%
Cysteine	54		>41%
Coenzyme Q-10	88	Borderline	>86%
Selenium	83		>74%
Vitamin E (A-tocopherol)	89		>84%
Alpha Lipoic Acid	87		>81%
Vitamin C	66		>40%
SPECTROX™			
Total Antioxidant Function	47	Borderline	>40%
Proliferation Index			
Immunidex	48	Borderline	>40%

The reference ranges listed in the above table are valid for male and female patients 12 years of age or older.

Adequate

Borderline

Deficient

Deficient

Values in this area represent a deficiency and may require nutrient repletion or dietary changes

Borderline

Values in this area represent a borderline and may require nutrient repletion or dietary changes.

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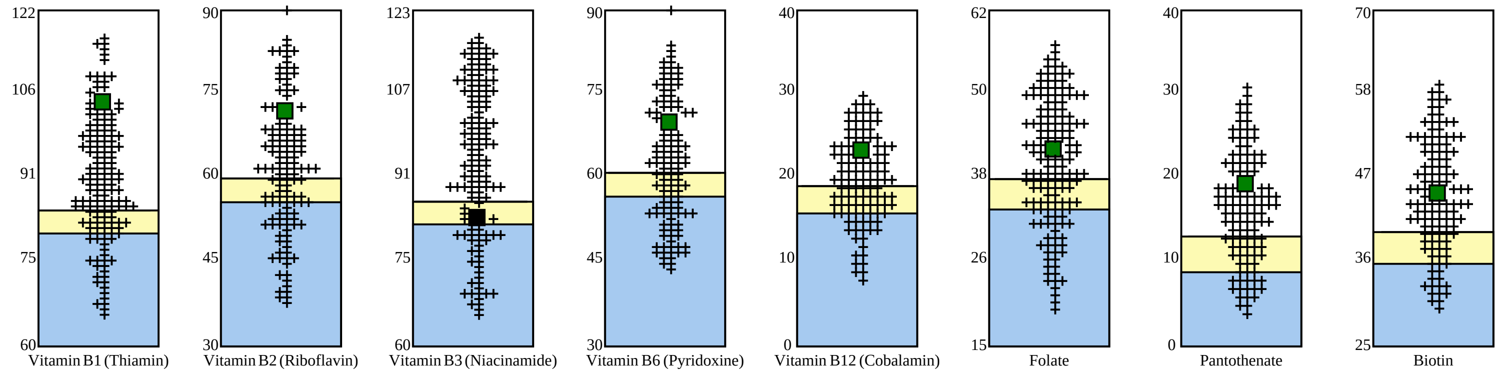
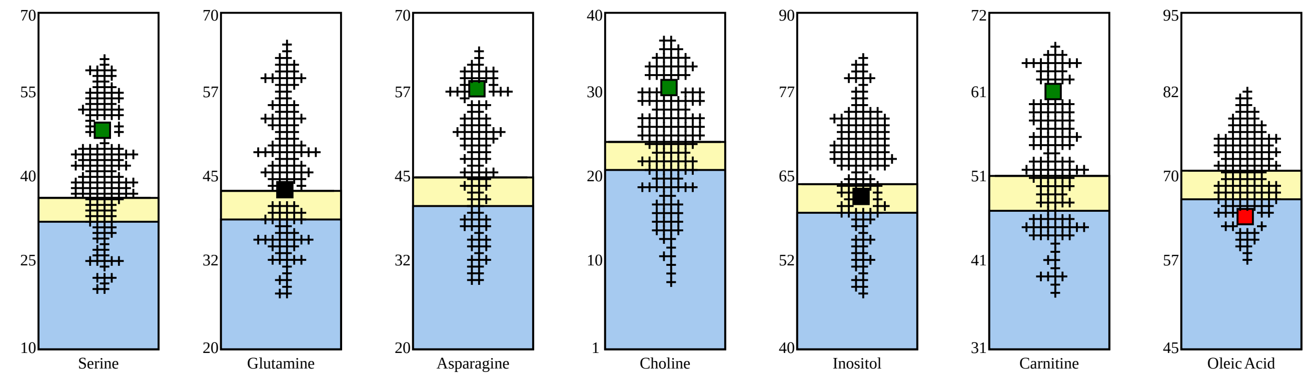
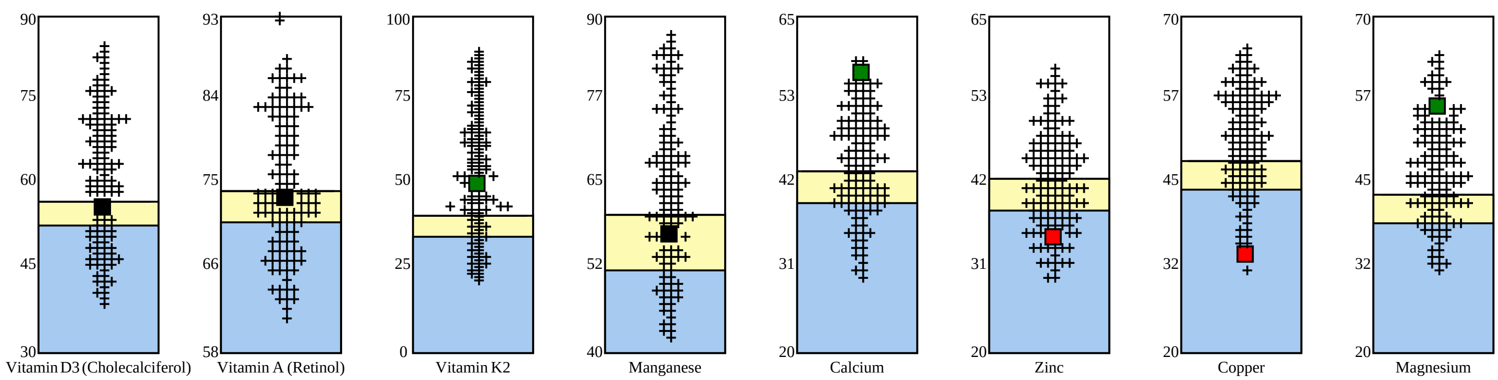
B Complex Vitamins



Amino Acids & Metabolites



Other Vitamins & Minerals



Adequate
Borderline
Deficient

Deficient
Values in this area represent a deficiency and may require nutrient repletion or dietary changes.

Borderline
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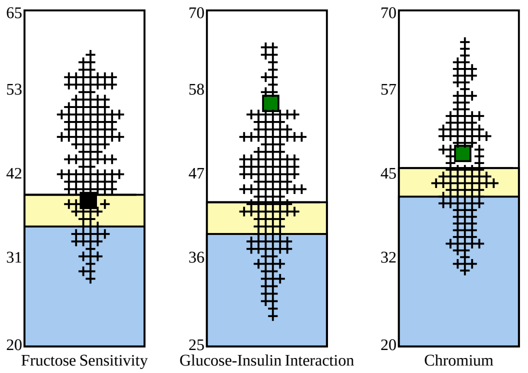
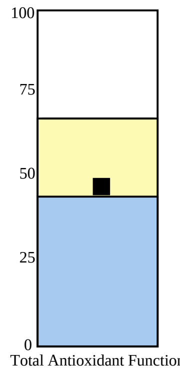
Carbohydrate Metabolism



Spectrox

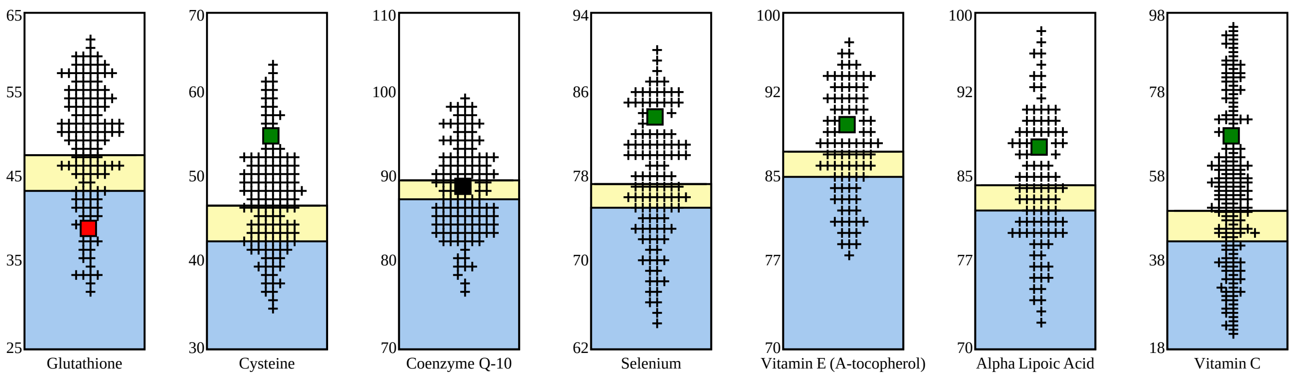


A Spectrox value above 65%-
indicates a desirable status for apparently healthy individuals. Since antioxidants are protective nutrients, the most desired status would be the greatest ability to resist oxidative stress.

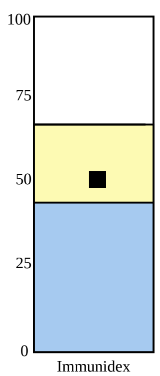
A Spectrox value between 40% and 65%-
indicates an average antioxidant function for apparently healthy individuals. An average status means the ability to resist oxidative stress similar to the majority of persons. However, average status is not ideal, nor is it clearly deficient.

A Spectrox value below 40%-
indicates a deficient antioxidant function resulting in a decreased ability to resist oxidative stress or an increased antioxidant load.

Individual Antioxidants



Immunidex



The Immunidex is an indication of the patient's T-Lymphoproliferative response to mitogen stimulation relative to the response of a control population. An average or weakened immune response may improve with correction of the nutritional deficiencies determined by the micronutrient testing.

An Immunidex above 65%- indicates a strong response, a measurement of cell-mediated immune function.

An Immunidex between 40% and 65% -
indicates an average response.

An Immunidex below 40%- may indicate a weakened cell mediated immune response.

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SUPPLEMENTAL INFORMATION

Name: **Angela L Taylor**
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Oleic Acid

Status:

The patient's lymphocytes have shown a deficient status for Oleic Acid (long-chain, monounsaturated, fatty acid)

Function:

Oleic acid is the most common monounsaturated fatty acid in human cells. Oleic acid is incorporated into cell membrane phospholipids, where it is important for proper membrane fluidity. Hormone responsiveness, infectivity of pathogens, mineral transport, and immune competence are affected by membrane fluidity.

Oleic acid is a major energy source for cells. Oleic acid is catabolized to acetyl groups used for energy (ATP) production and biosynthesis of many essential metabolites.

Oleic acid is obtained by cells from endogenous biosynthesis or from serum triglycerides. Biosynthesis of fatty acids (like oleic acid) utilizes the same enzymes responsible for elongation of other fatty acids which are precursors for eicosanoids (prostaglandins). Thus, deficient oleic acid status may also indicate deficient eicosanoid production, signifying a need for essential fatty acids.

Deficiency Symptoms:

No deficiency symptoms are clearly defined for oleic acid since a dietary intake is not absolutely essential. Monounsaturated fat intake may be beneficial for reducing high blood cholesterol levels. A need for oleic acid may possibly reflect a need for essential fatty acids (linoleic acid, linolenic acid), or omega-3 fatty acids (alpha linolenic acid, EPA, and DHA).

Repletion Information:

Dietary sources rich in Oleic Acid include:

Canola Oil	Olive Oil
Avocado Oil	Almond Oil
Avocados	High Oleic Safflower Oil

Although some margarines and shortenings are high in monounsaturated fats, a considerable amount is in the form of trans-monosaturated isomers (elaidic acid). Reductions in these foods are recommended to improve oleic acid status.

No RDA exists for oleic acid. No overt toxicity for fats rich in oleic acid is known, except for a laxative effect when consumed in large amounts (>50-100 grams per serving). Daily doses of 1-2 tablespoons of oleic-rich oils (olive, canola, avocado) are usually adequate to add significant dietary amounts of oleic acid.

Although flaxseed oil (edible linseed oil) contains little oleic acid, it is an excellent source of the essential fatty acids, linoleic acid and linolenic (omega-3) acid. Daily doses of 1-2 tablespoons per day will provide sufficient essential fatty acids to prevent essential fatty acid deficiencies.

Zinc

Status:

The patient's lymphocytes have shown a deficient status for Zinc.

Function:

The primary role of zinc is to activate almost 200 enzymes with vital roles in cell regulation, immune function, acid/base balance, DNA, RNA, and protein synthesis, lipid metabolism, eicosanoid production, and digestion. Zinc also is a component of insulin (energy metabolism), thymic hormones (immune function) and gustin (taste acuity).

Deficiency Symptoms:

Symptoms of zinc deficiency include fatigue, dermatitis, acne, loss of taste, poor wound healing, anorexia, decreased immunity, delayed growth, hypogonadism and delayed sexual maturation, diarrhea, skeletal abnormalities, alopecia, behavioral disturbances, white spots on fingernails, infertility and night blindness.

Those at risk for zinc deficiency include alcoholics, malnourished, malabsorption (Crohn's Disease, celiac disease), long-term parenteral nutrition, chronic renal disease, anorexics, dieters, pregnant women, elderly, and sickle-cell disease.

Repletion Information:

Dietary sources rich in Zinc (per serving) are:

Nutritional Supplements	Oysters
Red Meats	Wheat Germ
Seeds	Nuts
Soybean Products	Legumes
Potatoes	Zinc-Fortified Cereal Products

Compounds found in meats enhance absorption of zinc from plant sources.

The 1989 RDA for zinc is 12-15 mg. In general, daily doses up to 50mg of elemental zinc appear safe. Acute toxicity (nausea, vomiting, diarrhea, fever, muscle pain) may occur after intake of 1-2 grams of zinc. Chronic intakes of 150 mg of zinc for several months may impair certain immune responses, decrease high-density lipoprotein levels, or impair copper status (possibly leading to normocytic anemia). Significant differences in tolerability between inorganic zinc salts and organic zinc chelates exist with organic chelates recommended for supplementation.

Glutathione

Status:

The patient's lymphocytes have shown a deficient status for Glutathione.

Function:

Glutathione is implicated in many cellular functions including antioxidant protection and detoxification. It is also essential for the maintenance of cell membrane integrity in red blood cells. Intracellular glutathione concentrations are principally derived by intracellular synthesis, as few cells directly uptake glutathione from the surrounding extracellular fluid. The high concentration of glutathione in virtually all cells clearly indicates its importance in metabolic and oxidative detoxification processes. Glutathione may be considered the preeminent antioxidant.

Deficiency Symptoms:

A wide range of human conditions such as aging, cancer, atherosclerosis, arthritis, viral infections, AIDS, cardiovascular, neurodegenerative diseases and pulmonary diseases may be produced, or made worse, by "free radicals". Their treatment or prevention often includes antioxidants such as vitamin C, vitamin E, carotenoids and selenium. Glutathione is an essential component of the antioxidant defense system: producing a "sparing effect" for both tocopherol and ascorbate by reducing the oxidized forms, and by eliminating hydrogen peroxide by reacting with glutathione peroxidase. Cellular glutathione functions to decrease the formation of oxidized LDL, implicated in the development of atherosclerosis. T-lymphocytes become deficient in glutathione in the progression of AIDS which impairs immune function. Glutathione is also required for the synthesis of some prostaglandins from n-3 and n-6 polyunsaturated fatty acids which are important in the inflammatory response. Patients with adult respiratory distress syndrome are favorably affected by treatments that increase cellular glutathione.

Repletion Information:

Glutathione is poorly absorbed from the gastrointestinal tract and foods rich in glutathione do not appear to contribute to increases in intracellular glutathione levels. Cysteine appears to be the limiting amino acid in the intracellular synthesis of glutathione and supplementation with up to 2000 mg daily of N-Acetyl-L-Cysteine appears safe. Supplementation with cysteine is not recommended as it may be poorly tolerated by many patients. In addition, it may be rapidly oxidized to L-cystine, a less usable form for the synthesis of glutathione. Foods rich in cysteine are generally high protein foods such as meats, yogurt, wheat germ and eggs.

Copper

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Status:

The patient's lymphocytes have shown a deficient status for Copper.

Function:

Like most trace minerals, copper acts as an enzyme cofactor in several key metabolic processes in the body. Among its many functions, copper aids in the formation of bone, hemoglobin and red blood cells, therefore enabling the efficient transport of oxygen throughout the body.

In addition, copper works in balance with vitamin C and zinc to manufacture elastin (skin protein) as well as collagen and other structural proteins in cartilage and tendons. It is also involved in the healing process, energy production, hair and skin coloring (production of melanin) and taste sensitivity.

Copper stimulates the absorption of iron through the copper transport protein ceruloplasmin. Copper also aids in the metabolism of several fatty acids and helps prevent oxidative damage by serving as a cofactor to superoxide dismutase. In addition, copper is needed for proper insulation (myelination) of nerve cells and serves as a cofactor for the synthesis of the neurotransmitter norepinephrine.

Deficiency Symptoms:

Due to copper's role in the formation of collagen, copper deficiency can manifest as osteoporosis. Other possible signs of deficiency include anemia (due to its role in hemoglobin formation), baldness, diarrhea, general weakness, impaired respiratory function, myelopathy, decreased skin pigment, reduced resistance to infection and increased triglyceride levels. Evidence also links copper deficiency with increased oxidative damage to cell membranes.

Repletion Information:

The RDA for copper is 2 mg per day. Pharmacologic doses of copper in scientific studies usually range from 2-4 mg per day. Ingesting amounts over 10 mg per day regularly can result in nausea, although toxicity will typically occur at much higher levels (200 times the RDA). Ingestion of excessive levels of zinc, vitamin C or fructose can cause copper deficiency. About 30% of dietary copper is assimilated. Good dietary sources of copper include the following:

Oysters	Seeds	Dark leafy vegetables
Organ meats	Dried legumes	Whole grain breads
Nuts	Shellfish	Chocolate
Soybeans	Oats	Blackstrap molasses